



AOS & CICS Newsletter

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Manabe Awarded 2010 William Bowie Medal



AOS Senior Scientist Suki Manabe

AOS Senior Scientist and former faculty member Syukuro (Suki) Manabe has been selected as the 2010 William Bowie Medalist of the AGU for “outstanding contributions to fundamental geophysics and for unselfish cooperation in research.” The medal, awarded annually, will be presented at the 2010 AGU Fall Meeting in San Francisco and is AGU’s highest honor.

Manabe has been a leader in the development of climate models and their application to the study of climate. His pioneering work on the response of climate to increasing carbon dioxide paved the way for the projections of future climate that are used to inform policymakers throughout the world. He has been widely recognized for his contributions, including his election to the National Academy of Sciences and other professional groups. He is an honorary member of the American Meteorological Society, the recipient of the inaugural Blue Planet Prize and the Volvo Environmental Prize, as well as many other notable awards.

Manabe joins an esteemed group of former Bowie Medalists, including Ignacio Rodriquez-Iturbe, the James S. McDonnell Distinguished University Professor of Civil and Environmental Engineering, who was awarded the 2009 Medal. ■

Deepwater Horizon Oil Spill Prompts Study

The April 20, 2010 Deepwater Horizon spill has drawn considerable interest among both the scientific community and the general public, particularly with regard to underwater plumes of dissolved oil not visible at the surface.

In a recent study published in *Geophys. Res. Letters*, a team of scientists from GFDL and NOAA’s Office of Response and Recovery, including CICS scientist and lead author Alistair Adcroft, examine the fate and consequences of suspended and dissolved oil and methane from the Deepwater Horizon oil spill. Using a high-resolution global ocean climate model and taking into account the microbial oxidation of hydrocarbons to explore the probable extent of toxic concentrations of dissolved oil and of significant deep (1000-1300 m) oxygen depletion arising from the spill, the scientists found that the interior ocean hypoxia or toxic concentrations of dissolved oil arising from the Deepwater Horizon blowout are likely to be “locally significant but regionally confined to the northern Gulf of Mexico.”

The underwater plumes of dissolved and suspended oil were simulated as originating from a point source in the northern Gulf of Mexico. An upper-bound supply rate to the plumes was estimated from the contemporary analysis of the

Program in Atmospheric and Oceanic Sciences (AOS) & The Cooperative Institute for Climate Science (CICS)

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TigerTransit/Shuttle Services
Operating on Fall Schedule
<http://www.princeton.edu/transportation/ForrestalFall10.pdf>

Deepwater Horizon blowout and a simple model of the temperature-dependent biological decay of dissolved oil was embedded in an ocean climate model. The behavior of plumes at different depths was found to be determined by the combination of sheared current strength and the vertical profile of decay rate. During their investigation, the team discovered that, for all plume scenarios, toxic levels of dissolved oil remained confined to the northern Gulf of Mexico, and abated within weeks after the spill stopped. According to the researchers, an estimate of oxygen consumption due to microbial oxidation of hydrocarbons suggests that a deep plume of hydrocarbons could lead to localized regions of prolonged hypoxia near the source, but only when oxidation of methane is included. According to Adcroft, the observations of the deep plumes are just beginning to get published and they have so far been broadly consistent with the model results. However, he adds that this is mostly because the microbial decay has not yet had time to act fully; the real test of the model will be in the months to come when the microbes have had a chance to consume most a lot of the hydrocarbons and dissolved oxygen.

For access to the full story and pdf, please go to:

<<http://www.gfdl.noaa.gov/simulations-of-underwater-plumes-of-oil-in-the-gulf-of-mexico>> ■

Delworth Appointed Lecturer in Geosciences and AOS Program

GFDL Research Scientist Tom Delworth has been appointed a lecturer in the Department of Geosciences and the AOS Program. He is currently teaching AOS 577 Weather & Climate Dynamics.

A Group Leader in the Climate Change, Variability and Prediction Group at GFDL, Delworth's interests include how climate changes on time scales of decades to centuries, including human-induced climate change, the role of the ocean in

climate variability and change, the Atlantic



Geosciences & AOS Lecturer Tom Delworth

Meridional Overturning Circulation (AMOC) and climate, and climate predictability. "We're so pleased to have Tom on our faculty; he brings a fresh approach to teaching and research and fills important gaps in our curriculum. I am confident that he will continue the tradition of excellence in our Program," AOS Director Jorge Sarmiento said. ■

AOS Students Welcomed at New Student Orientation

First-year AOS Graduate Students Kityan Choi and Wenyu Zhou were welcomed by faculty and fellow graduate students during the new student orientation on Monday, September 13th.

Following breakfast and introductions in Guyot Hall, an informal luncheon was held in Sayre Hall to acquaint the new students with AOS faculty members and students. Discussions with faculty, the Director of Graduate Studies (DGS) Sonya Legg, and the Graduate Work Committee followed the luncheon. Later in the afternoon, the students returned to Main Campus for a presentation by Legg on the unique collaboration between GFDL and AOS. The program concluded with a picnic at Guyot Hall.

The students were welcomed to the broader campus community on September 10th at the International Student Orientation and on September 14th at the University's Graduate Student Orientation.

"Our graduate students are the heart of our Program; we are extremely excited to have Kityan and Wenyu join our AOS community," AOS Director Jorge Sarmiento said.

Choi, who arrived from Hong Kong, will be mentored by GFDL Senior Research Scientist and AOS Lecturer Isaac Held. Zhou, who hails from Beijing, will be advised by Sonya Legg. ■

AOS Hosts Summer Interns

The AOS summer internship program attracted three talented and aspiring young scientists to the Forrester campus this summer. Working side-by-side with active research faculty and staff were Princeton Undergraduates Andrew Budnick and Cynthia Kanno, and Rutgers Undergraduate Stephanie Winter. The three were mentored by Postdoctoral Research Associate Stephanie Downes, Associate Research Scholar Jaime Palter, and Assistant Professor David Medvigy, respectively.

In a project entitled, "Changes in Antarctic Circumpolar Current (ACC) fronts and transports in wind perturbation models," Andrew Budnick coded a sea surface height method for calculating fronts in the ACC in the 1/4-degree GFDL model, and assessed how the front position and associated ACC transport changed in response to an increased wind stress anomaly. He found that the wind changes had the greatest impact in flat-bottomed regions, and that the changes were greater in the summer months. "Andrew was a delight to work with -- he came in as a student interested in Antarctica with a chemistry background, and departed a physical oceanographer," commented Downes. "The internship was definitely successful and educational for the Sarmiento group. Andrew worked hard throughout his two months at AOS and I look forward to working with him to get his interesting model analysis results published," she added. "The internship at AOS was unique (so far in my life, anyway) in that I wasn't just making a presentation to get a grade; I was actually contributing to Science with a capital 'S.'" And, unlike some of the research

internships in biology or chemistry, there were only a few of us so I pretty much got as much attention as I wanted from the rest of the department. I got a real feel for what AOS scientists do, because I was doing it as well," Budnick noted.

Cynthia Kanno studied temporal variability in nutrient concentrations in the subtropical North Pacific and how it related to the variability of exchange across the Kuroshio Current and the Pacific Decadal Oscillation (PDO). Her analysis of the observational record suggests that the negative PDO time period of the 1970s was linked to high concentrations and strong variability in surface nutrients, and vice versa for the positive PDO period of the 1990s. This PDO-nutrient relationship was opposite to expectations based on previous work studying physical variability in the region. She looks forward to further delving into this problem in the future to find a possible cause for the signal. "Cynthia's enthusiasm for science was infectious and her fresh outlook on the questions we posed was inspiring. Using observational data, Cynthia found a signal of temporal variability in the subtropical North Pacific that may challenge the current paradigm of what governs variability in the region. Working with her as she explored this problem was one of the most rewarding things I've had the opportunity to do in AOS," said Palter. "I had a wonderful experience researching at Sayre Hall. Everyone was so welcoming and glad to help whenever I had a question. Over the summer, I hoped to gain a better understanding of my research topic but in reality I learned so much more. This internship gave me the opportunity to interact with people with careers in research and truly get a sense of what the occupation is like," Kanno said.

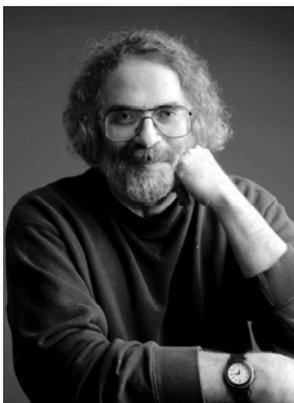
The Amazon tropical forest is being deforested approximately at a rate of $2 \times 10^4 \text{ km}^2 \text{ y}^{-1}$. The local, regional, and global hydroclimatic changes resulting from this replacement of natural forest by degraded vegetation has yet to be fully understood and quantified. Stephanie Winter, currently a senior at Rutgers University, began working on several facets of this problem during the summer under the supervision of Assistant Professor David Medvigy. In particular, Winter used currently available datasets to determine areas of South America that experienced abrupt precipitation changes in the past 40 years that may be linked to

deforestation. She hopes to continue this research during the academic year.

According to AOS Director Jorge Sarmiento, "The summer internships not only provide valuable opportunities to engage in scholarly scientific research, but perhaps more importantly, promote interaction and dialogue between the young scholars who spend time with us. It is gratifying to know that they consider it time well spent." ■

Held Joins FUSION Dialogue on Global Warming

On Thursday, September 23rd, Isaac Held, a lecturer with rank of Professor in the AOS Program and senior research scientist at GFDL, joined Professors Fred Singer, Professor Emeritus of Environmental Science, University of Virginia, and Robert Socolow, Professor of Mechanical and Aerospace Engineering at Princeton, for a



Isaac Held, AOS Lecturer & GFDL Senior Scientist

that connects Princeton University's scientists and humanists.

Together with Singer, an outspoken critic of the mainstream scientific assessment of global warming, Held and Socolow catalyzed a conversation about climate change in which Held "agreed with the IPCC's central conclusion that anthropogenic warming has clearly emerged from the background of climate noise in the last 50 years." He briefly explained the scientific basis of his opinion to an audience composed mostly of Princeton undergraduate students.

lively 90 minute discussion about global warming. The discussion was a part of themed monthly series run by Fusion, a student organization

Held furthered his argument by asserting that the distribution of views among climate scientists on the issue of the sensitivity to carbon dioxide looked to him, from inside the climate research community, as "more or less normally distributed, with a well-defined consensus position well-reflected by the IPCC (with interesting arguments put forward by people with views on the wings)." He noted, however, that "after passing through the filter of the blogosphere and mainstream media, the impression is of a bifurcation between two distinct non-overlapping camps. This misleading impression of the science is now what much of public has and will be hard to dispel."

The event was held in the Frist Campus Center. For a schedule of upcoming FUSION events, see:

<<http://www.princeton.edu/~fusion/upcoming-events.html>>. ■

GFDL Science Strategic Plan Underway

In response to recommendations resulting from GFDL's Laboratory Review in July of 2009 and taking into account that GFDL is nearing the peak of its research activities for the Intergovernmental Panel on Climate Change (IPCC) fifth assessment report (AR5), GFDL's Science Strategic Plan (SSP) for next five to ten years is now underway.

On September 10th, a lab-wide meeting was held to introduce the planning process and to gather input for the development of the SSP. Two overarching questions were addressed, in an effort to articulate GFDL's scientific vision and goals for the next decade: "Given GFDL's expertise and experience in planning and executing long lead-time research, what should be GFDL's scientific objectives the next 5 -10 years?" and "How do we plan on achieving these scientific goals?"

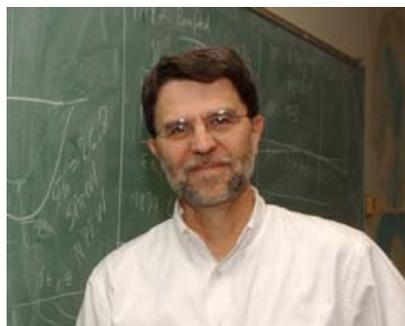
Four days later, a day-long meeting was held at Lewis Library to further develop and refine the Plan. Through a series of in-depth exchanges, a group of the Lab's scientific experts accomplished what they

had set out to do -- lay the groundwork for the five to ten year Plan.

As the final part of the planning process, the Writing Team for the SSP, including GFDL Scientists Mike Winton (Chair), John Dunne, Sonya Legg, Tom Knutson, Chris Golaz, Steve Garner, and Paul Ginoux, will begin the work of drafting the Plan itself, based on the September 14th discussions. It is anticipated that the Plan will take approximately three months to compile.

“The final Plan is of great interest to the AOS Program and CICS, since much of our research entails a high level of collaboration with GFDL; I look forward to its fruition,” noted AOS & CICS Director Jorge Sarmiento. ■

Director's Corner



In thinking about the upcoming academic year and all the possibilities that it holds for our Program, I couldn't help but be reminded of how very far we've come since the Program's serendipitous beginnings. I believe that it is important to look back, take stock and honor what has been accomplished by so many.

We are extremely fortunate to have some folks still here with us who were here from the Program's inception and played a role in its rich history. Using the input of Professor Emeritus George Mellor, AOS Senior Scientists Kirk Bryan, Suki Manabe, and Kiku Miyakoda, and AOS Lecturer Isidoro Orlanski, along with historical records, we have compiled an anecdotal history of sorts that traces the history of the Program and its longstanding ties to GFDL. We are pleased to share it with our faculty, students and staff.

For access to the pdf, please go to:
<http://www.princeton.edu/aos/links/AOS_Program_History.pdf>

AOS & CICS Research in Action

[This column is intended to focus on AOS & CICS research accomplishments and milestones, past, present, and future. In this issue, we highlight the accomplishments of Jaime Palter who spent over two years in Jorge Sarmiento's group.]

After more than two years working in Jorge Sarmiento's group, Jaime Palter will be moving to Montreal, Canada to begin a new position as Assistant Professor in McGill's Department of Atmospheric and Oceanic Sciences. Jaime is a physical oceanographer who made the leap from purely observational studies to analysis of models at Princeton. Her research deals with the role of water mass formation and upper ocean circulation on the cycling of nutrients and carbon. Ultimately, the work seeks an understanding of the physical forcing that gives rise to spatial and temporal variability in nutrient supply to the upper ocean and carbon supply to the deep ocean.



Associate Research Scholar Jaime Palter

"Jaime has a real curiosity for understanding how the ocean works. In particular, she's looked at the key transport pathways and physical processes that regulate the living ocean. Her passion for bringing both models and data to bear on these questions is something that I appreciate a lot," GFDL Oceanographer and AOS Faculty Member Anand Gnanadesikan remarked."

“Working in AOS and in Jorge's group has taught me so much about modeling and the ocean in general. I have been continuously amazed over the past two years at the breadth and depth of the group's knowledge and interests, and treasure the rewarding collaborations within the group and with scientists at GFDL. I am also grateful for the experience of teaching a little bit each year, which provided the great fun of interacting with Princeton's curious and creative undergraduate students.”

“Jaime has proven to be a valuable asset to our group. Her scientific contributions, both individually and jointly with colleagues here and at GFDL, have extended our understanding of ocean circulation. She has a unique ability to convey the wonder of scientific discovery; her enthusiasm is nothing less than contagious,” added AOS Director Jorge Sarmiento.

Jaime's scheduled departure is mid-December. ■

AOS & CICS News

Jorge Sarmiento has received one of 21 grants awarded by the National Science Foundation (NSF) to study the effects of ocean acidification on marine ecosystems. For the full story, see:

<http://www.nsf.gov/news/news_summ.jsp?cntn_id=117823&org=NSF&from=news>

Congratulations to AOS Postdoctoral Research Fellow **Claudie Beaulieu** who was selected to participate in a visiting fellowship for the Mathematical and Statistical Approaches to Climate Modelling and Prediction Programme at the Isaac Newton Institute for Mathematical Sciences in Cambridge. The Program brings together world-leading



AOS Postdoctoral Research Fellow Claudie Beaulieu

researchers in climate modeling, mathematics and statistics in order to make progress in solving some of the major issues facing climate prediction. It focuses on two key

themes: the development of improved stochastic sub-grid-scale physics models, which have the potential to improve the variability of ensemble climate simulations, and the use of statistical techniques to create a theoretically sound basis for probabilistic climate prediction. The Program runs from August 11 to December 22, 2010. **Beaulieu** will spend the month of October as a visiting fellow.

Additional congratulations to **Claudie** for being awarded the "Best 2009 Ph.D. thesis in science and engineering in Quebec" for her thesis entitled, "*Homogenization of precipitation series.*" The prize is given by the ADESAQ (Association des doyens des études supérieures au Québec), which can be translated as the Association of Deans of Graduate Studies in Quebec, in collaboration with the FQRNT (Fonds Québécois de Recherche sur la Nature et les Technologies), a foundation that awards funds for research in science and engineering.

The \$2000 prize and excellence certificate was presented at the ACFAS (Association francophone pour le savoir) conference gala in Montreal on October 7, 2010.

Congratulations to former CICS Scientist and CEE Graduate Student **Ning Lin** on her selection as the recipient of the 2010 AGU Natural Hazards Focus Group Award for Graduate Research. The award is given for Ning's original research on multi-hazard risk analysis related to hurricanes. The award will be presented at the Reception of the Focus Group at the 2010 AGU Fall Meeting in San Francisco.

Graduate Student Lounge

The Graduate Student Lounge, a first of its kind space devoted to AOS graduate students, opened last week. The new graduate space, located on Sayre Hall's second floor, is a multi-purpose area dedicated to providing study and work space. It also serves as a central meeting point for socializing among graduate students. The new lounge was amongst the suggestions to come out of the October 4th graduate student town hall meeting.

On September 10th, the GFDLEA and AOS students hosted a mini-golf night at Pine Creek Miniature Golf Course in East Amwell. Congratulations to 1st place winner, AOS Graduate Student **Ilissa Ocko**, who finished the round two strokes under par! Postdoctoral Research Associate **Lucas Harris** earned bragging rights for a noteworthy hole-in-one. A fun time was had by all!

Visiting Research Collaborators

The AOS Program would like to acknowledge **Charlie Stock** who was recently appointed as a Visiting Research Collaborator, a new category of appointments which recognizes the sterling efforts of GFDL staff members in helping to advise graduate students.

In an effort to be more welcoming to **AOS Graduate Students** and to encourage them to participate to the fullest extent in the GFDL community, the GFDLEA Board voted unanimously, at its last meeting, to allow students to participate in GFDLEA events at member rates and benefits and not have to pay the annual membership dues.

AOS Program Logos are now available for use thanks to AOS Graduate Student **Ilissa Ocko**. The four newly-designed logos may be used for posters, presentations, apparel, etc. Any questions regarding the use of these logos may be referred to Ilissa.

Arrivals

Cheryl Logan arrived in October to work with John Dunne and Geoff Vallis as a Postdoctoral Research Associate. Her research focuses on assessing coral vulnerability under climate change and ocean acidification.

Su-Jong Jeong arrived in October to work with David Medvigy as a Postdoctoral Research Associate. His research focuses on the linkages between vegetation phenology and climate.

Sophie Zhang will arrive in November to work with Geoff Vallis and Bob Hallberg as a Postdoctoral Research Associate. Her research focuses on the dynamics of the Atlantic meridional overturning circulation between the Labrador Sea and the Grand Banks.

Graduate Student Defenses

Yuanyuan Fang, under the guidance of Larry Horowitz, successfully defended her thesis (September 2010) entitled, "*The Impacts of Emissions, Meteorology and Climate Change on Pollution Transport.*" She has accepted a postdoctoral position under Denise Mauzerall at Princeton's Woodrow Wilson School.

Departures

Salil Mahajan – August 2010
Oak Ridge National Laboratory (ORNL)

Eun Young Kwon – October 2010, who will work remotely from California with Jorge Sarmiento's group

Jaime Palter - December 2010
McGill University, Department of Atmospheric and Oceanic Sciences, Montreal Canada

Birth Announcements

Congratulations to **Marian Westley** (GFDL) and her husband on the birth of their son, Jacob Owen, who was born on September 22, 2010, weighing 8 lbs. 10oz.

AOS Program
Princeton University
Sayre Hall
300 Forrester Road
Princeton, NJ 08540

Phone:
(609) 258-6047

Fax:
(609) 258-2850

We're on the Web!
www.aos.princeton.edu

Editor: **Joanne Curcio**
Email:
jcurcio@princeton.edu